

# **Real-Time Traffic Data Collection**

## **Using Existing Traffic Cams**

### **Santa Clara County Approach**

**Presented by:**

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**Sr. Civil Engineer, Traffic Engineering & Operations**



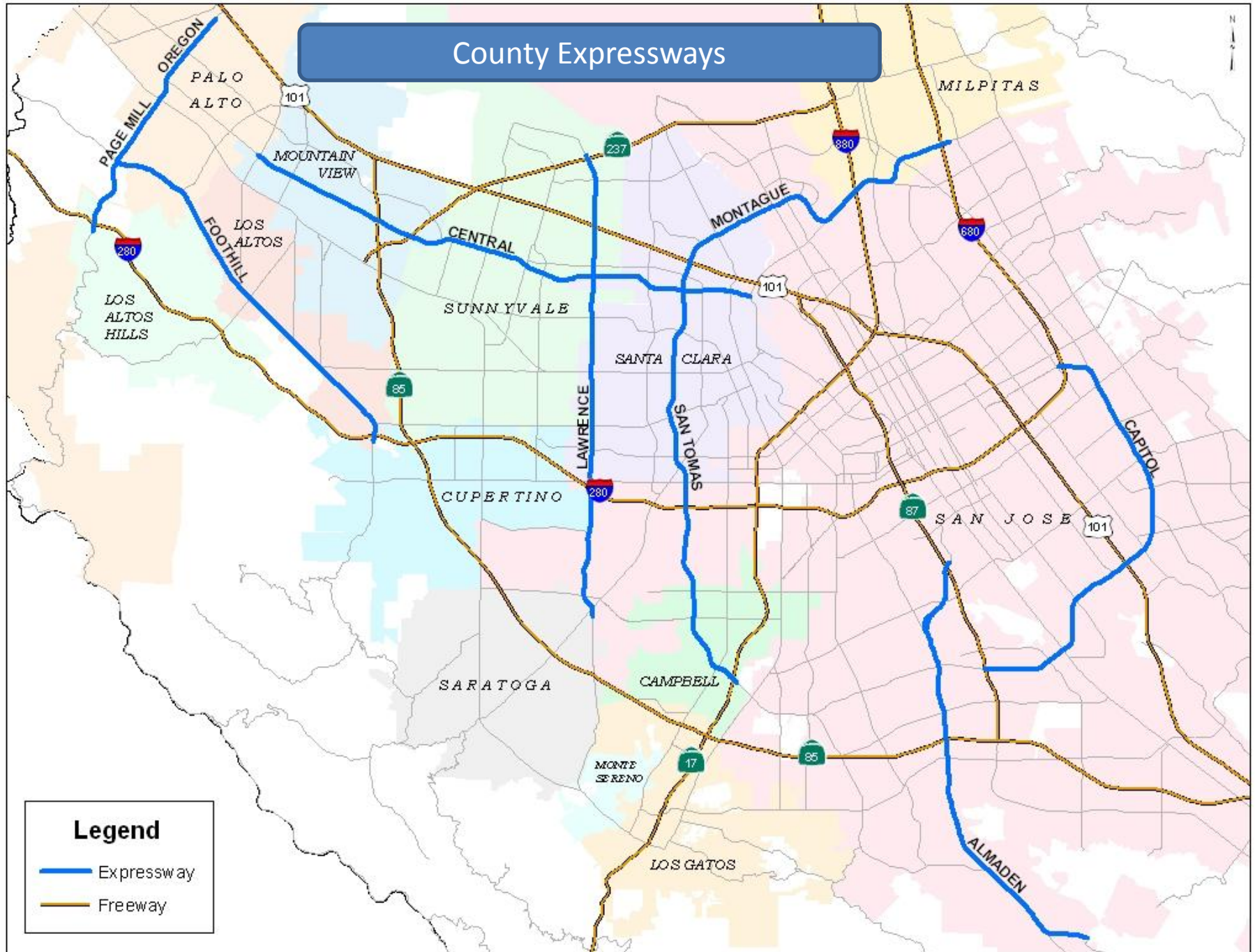
**County of Santa Clara  
Roads and Airports Department**

**June 3, 2013**

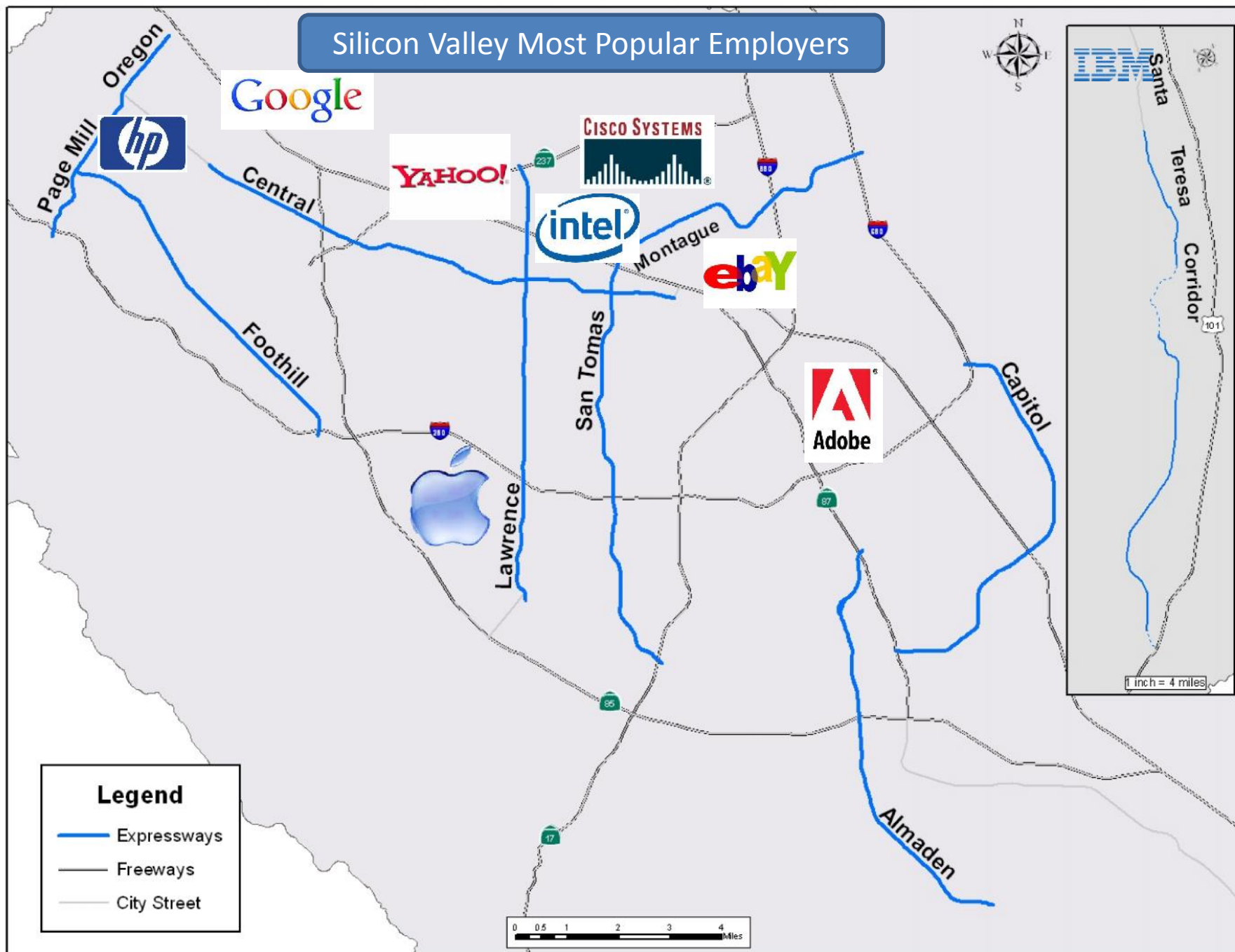




## County Expressways



## Silicon Valley Most Popular Employers



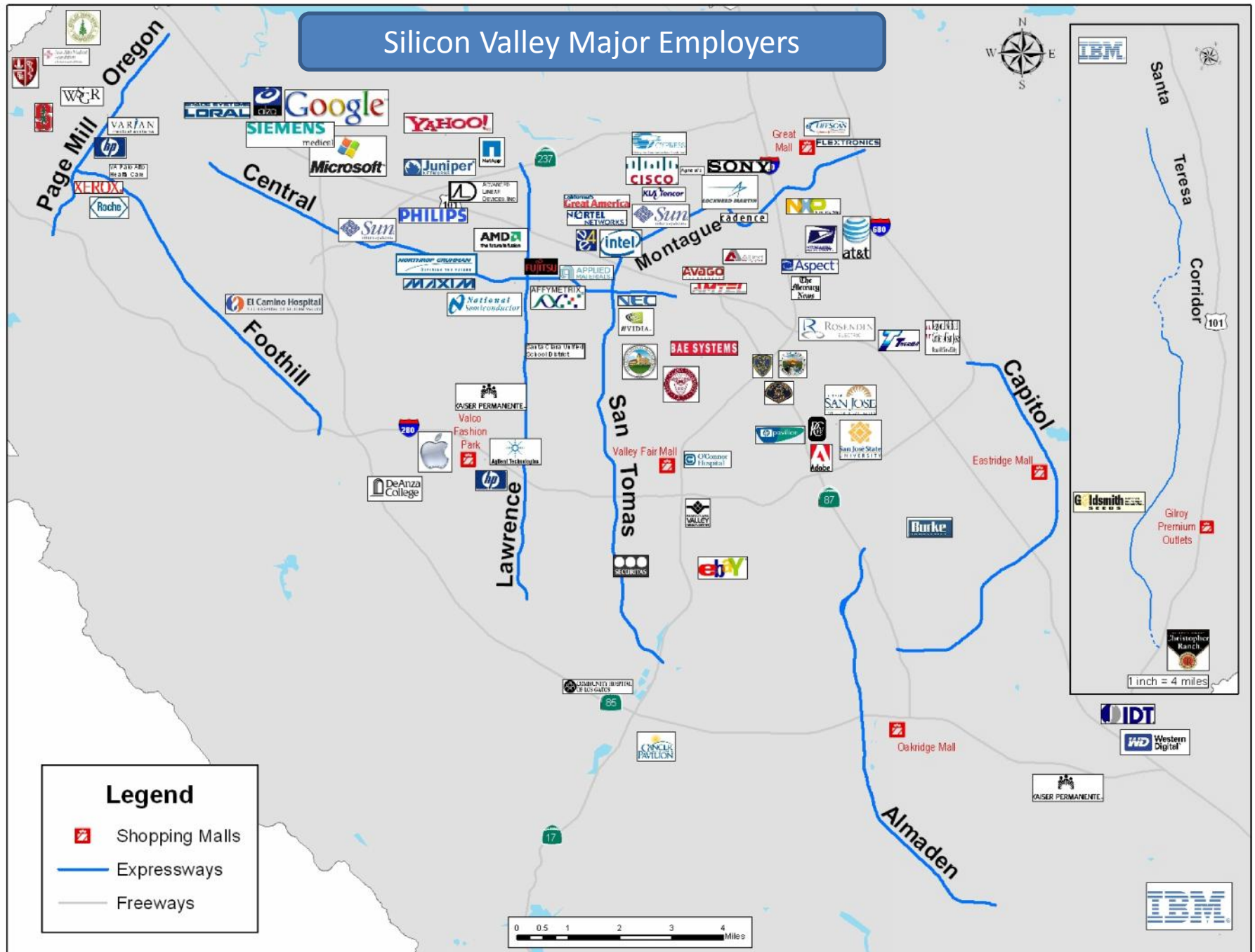


# Silicon Valley Major Employers

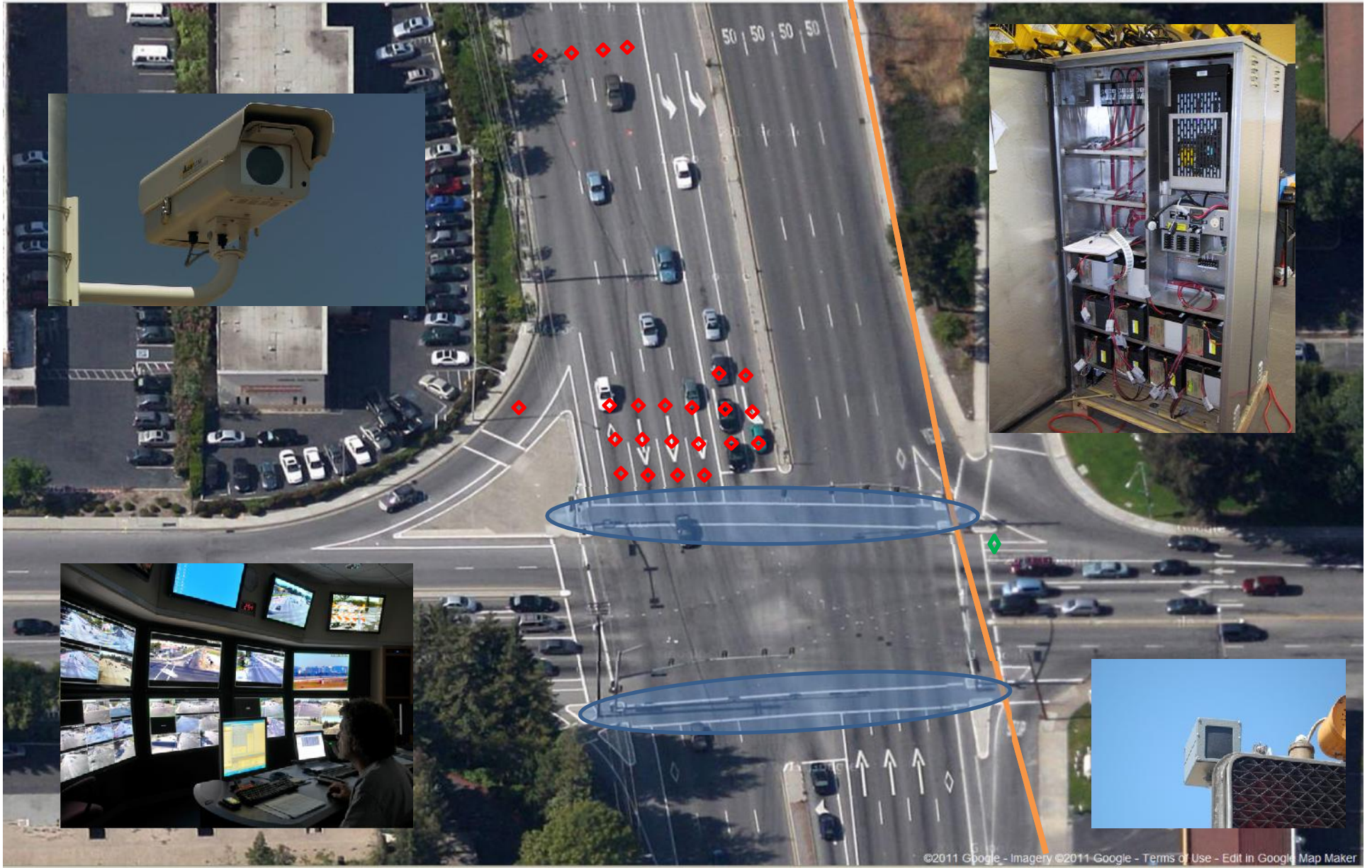


**Legend**

- Shopping Malls
- Expressways
- Freeways



## Expressway ITS Infrastructure



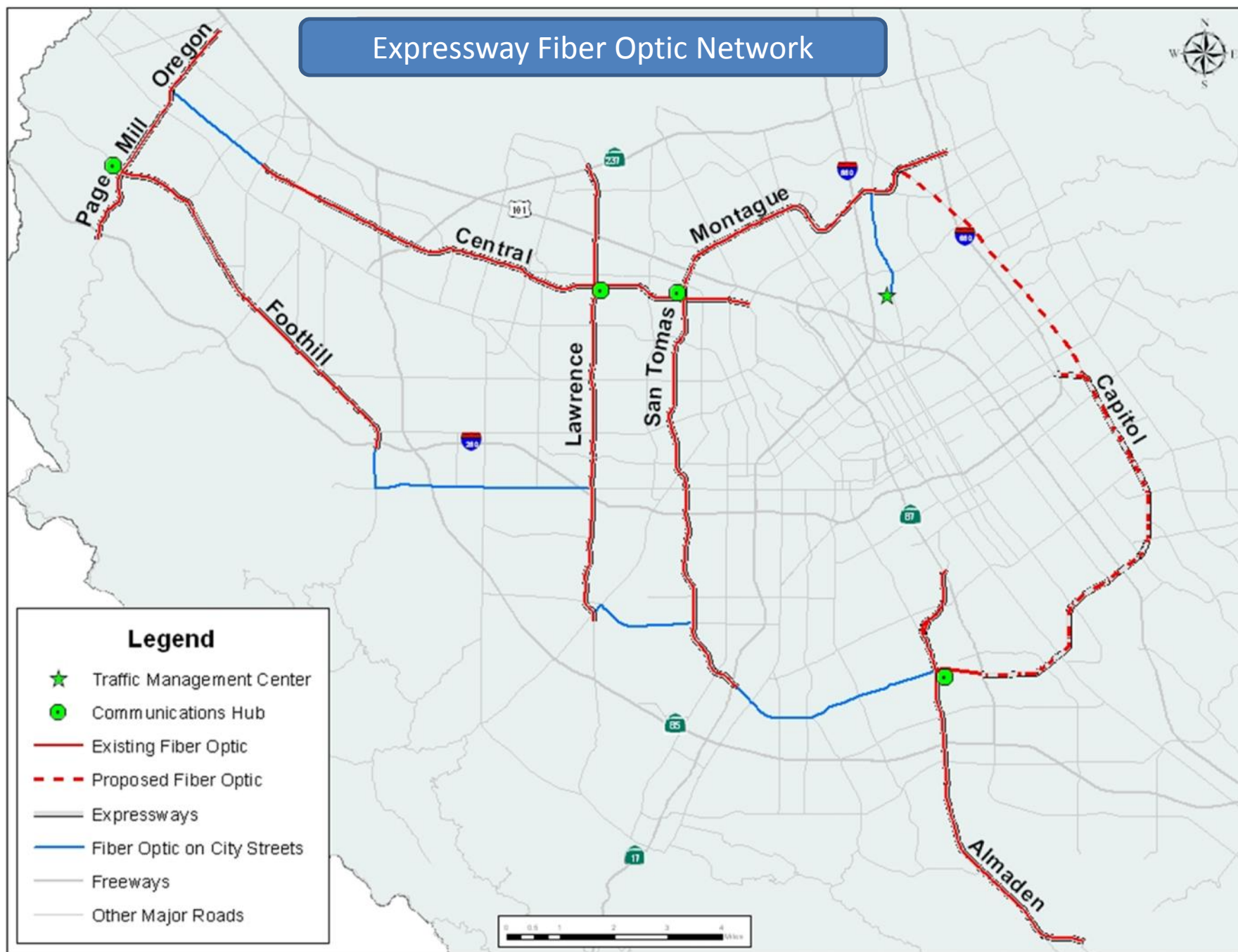


## Expressway Fiber Optic Network

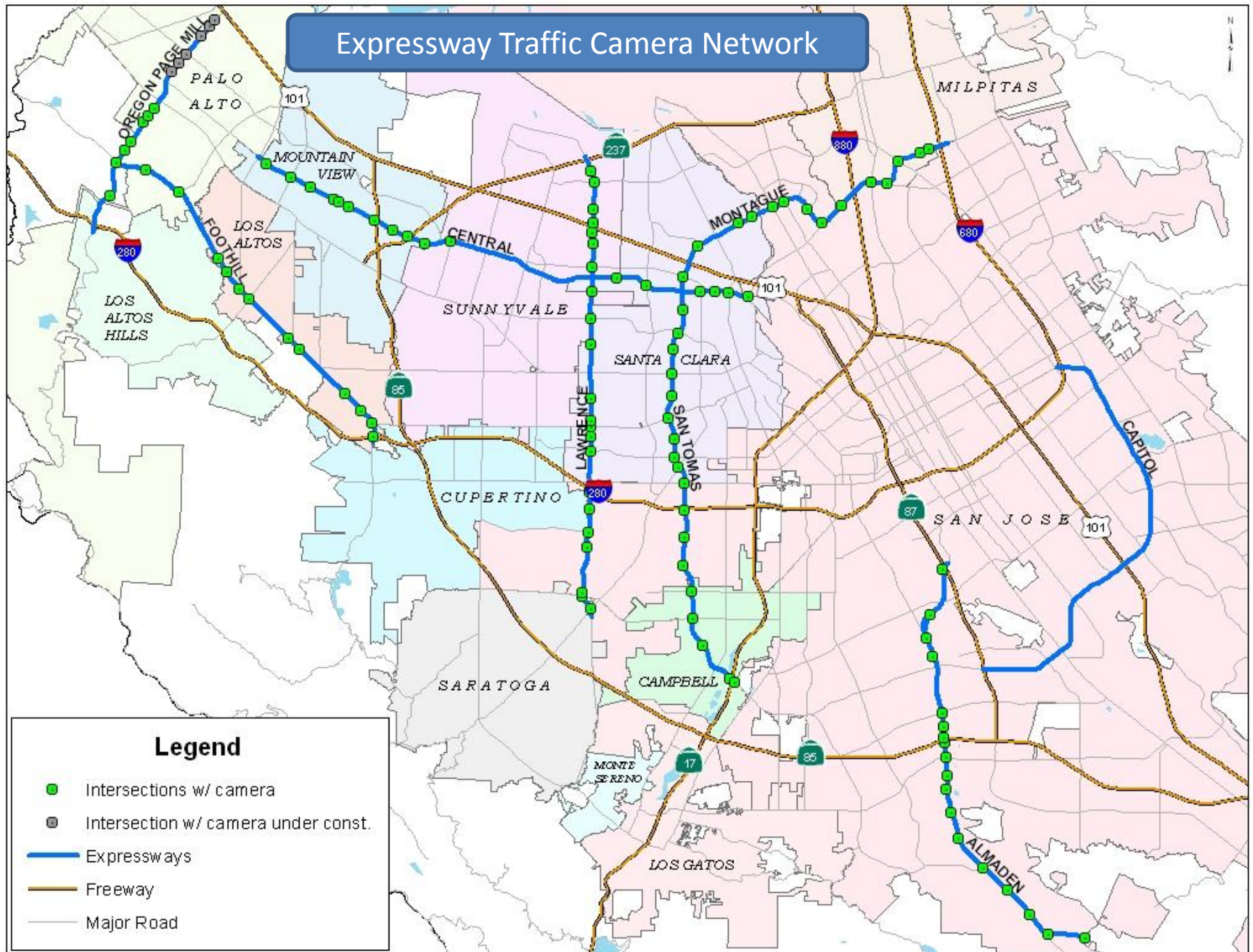


### Legend

- ★ Traffic Management Center
- Communications Hub
- Existing Fiber Optic
- - - Proposed Fiber Optic
- Expressways
- Fiber Optic on City Streets
- Freeways
- Other Major Roads

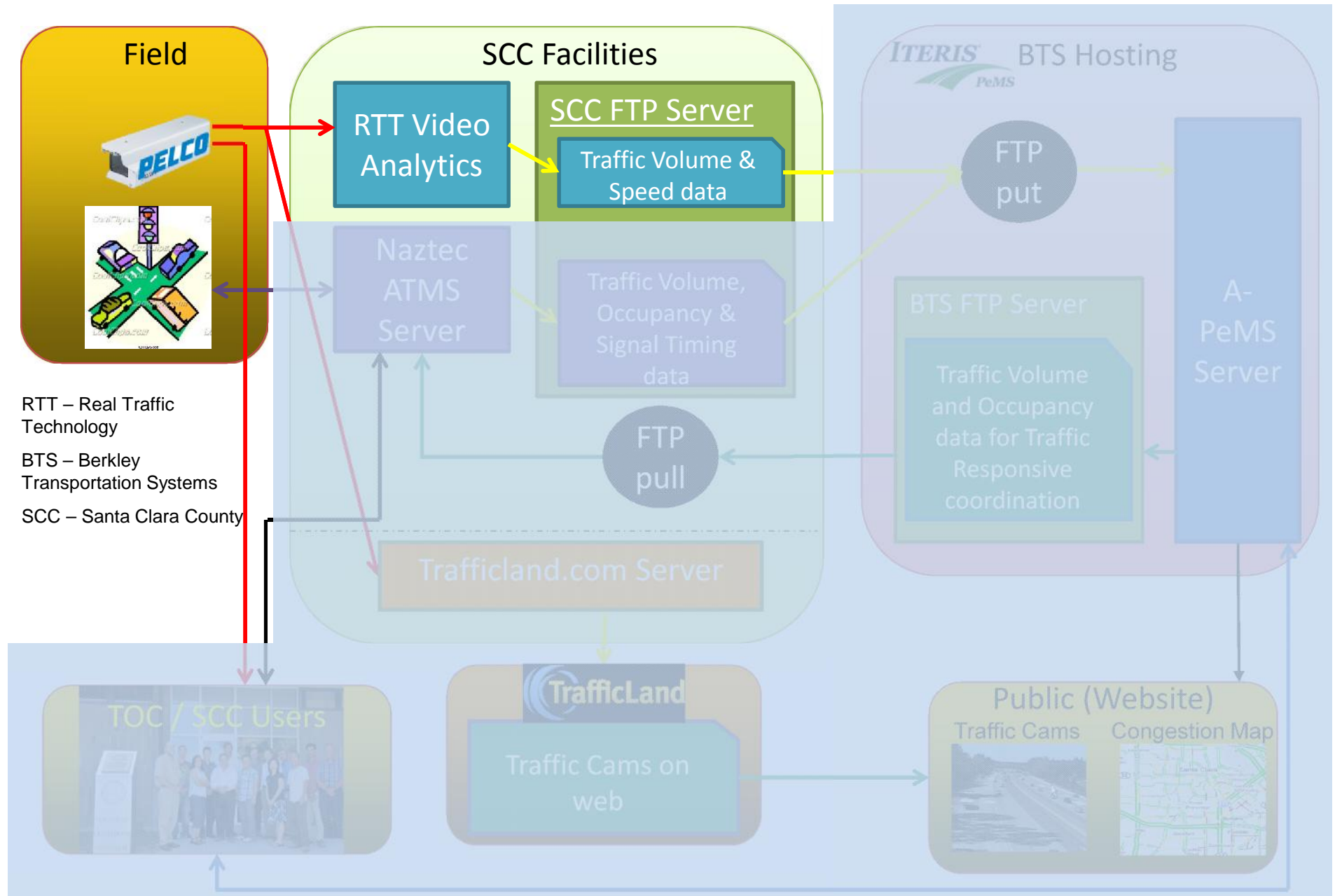


## Expressway Traffic Camera Network





# Santa Clara County Traffic Data Flow Diagram



RTTViewer

File Proc Edit!

Camera List

1 CAM\_1608

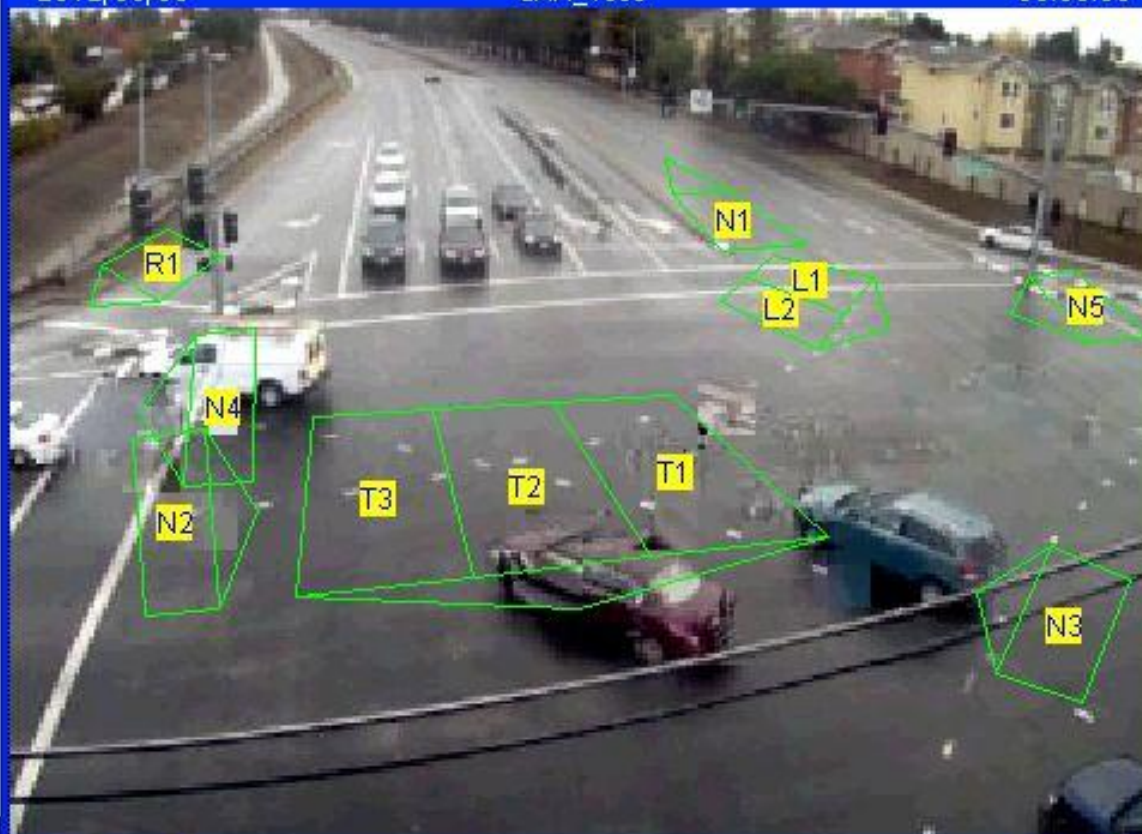


Count - Speed

2012/00/00

CAM\_1608

00:00:00



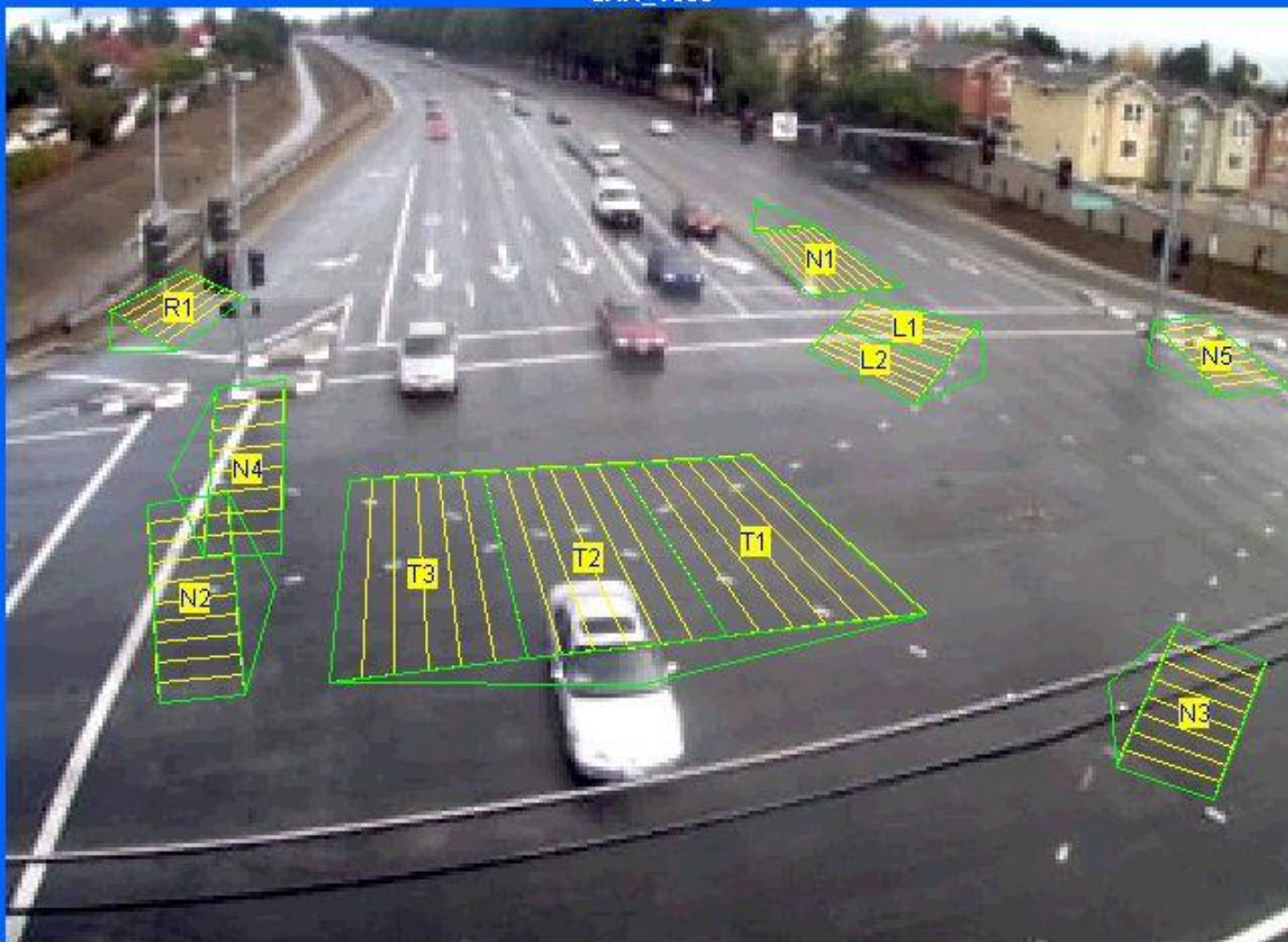


RTTViewConfig

View List



CAM\_1608



View

New

Delete

Undo

Update

Capture

Lane

New

New HB

Delete

Delete All

Properties

Calib Speed

Camera

☒ On/Off

Update

Cancel

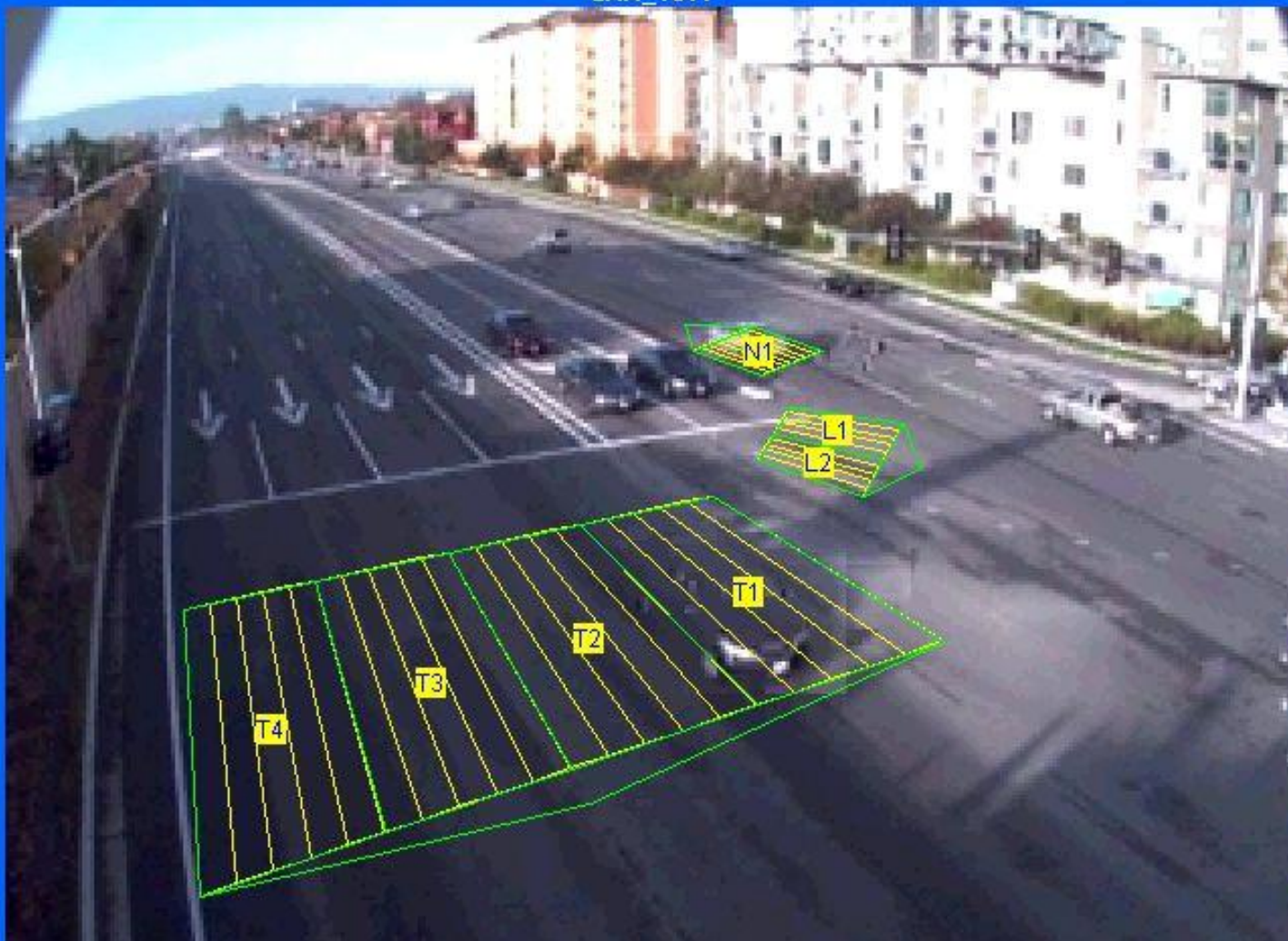
View\_000

RTTViewConfig



View List

CAM\_1811



View

New

Delete

Undo

Update

Capture

Lane

New

New HB

Delete

Delete All

Properties

Calib Speed

Camera

☒ On/Off

Update

Cancel

View\_000



RTTViewer

File Proc Edit!

Camera List

1	CAM_1811
---	----------

2012/00/00 CAM\_1811 00:00:00

Count - Speed

REALTRAFFIC TECHNOLOGIES

N1

L1

L2

RTTVProcAVI.exe

Frame 6140 = 05:07.00  
Frame 6160 = 05:08.00  
Frame 6180 = 05:09.00  
Frame 6200 = 05:10.00  
Frame 6220 = 05:11.00  
Frame 6240 = 05:12.00  
Frame 6260 = 05:13.00  
Frame 6280 = 05:14.00  
Frame 6300 = 05:15.00  
Frame 6320 = 05:16.00  
Frame 6340 = 05:17.00  
Frame 6360 = 05:18.00  
Frame 6380 = 05:19.00  
Frame 6400 = 05:20.00  
Frame 6420 = 05:21.00  
Frame 6440 = 05:22.00  
Frame 6460 = 05:23.00  
Frame 6480 = 05:24.00  
Frame 6500 = 05:25.00  
Frame 6520 = 05:26.00  
Frame 6540 = 05:27.00  
Frame 6560 = 05:28.00  
Frame 6580 = 05:29.00  
Frame 6600 = 05:30.00

3x

RTTViewer

File Proc Edit!

Camera List

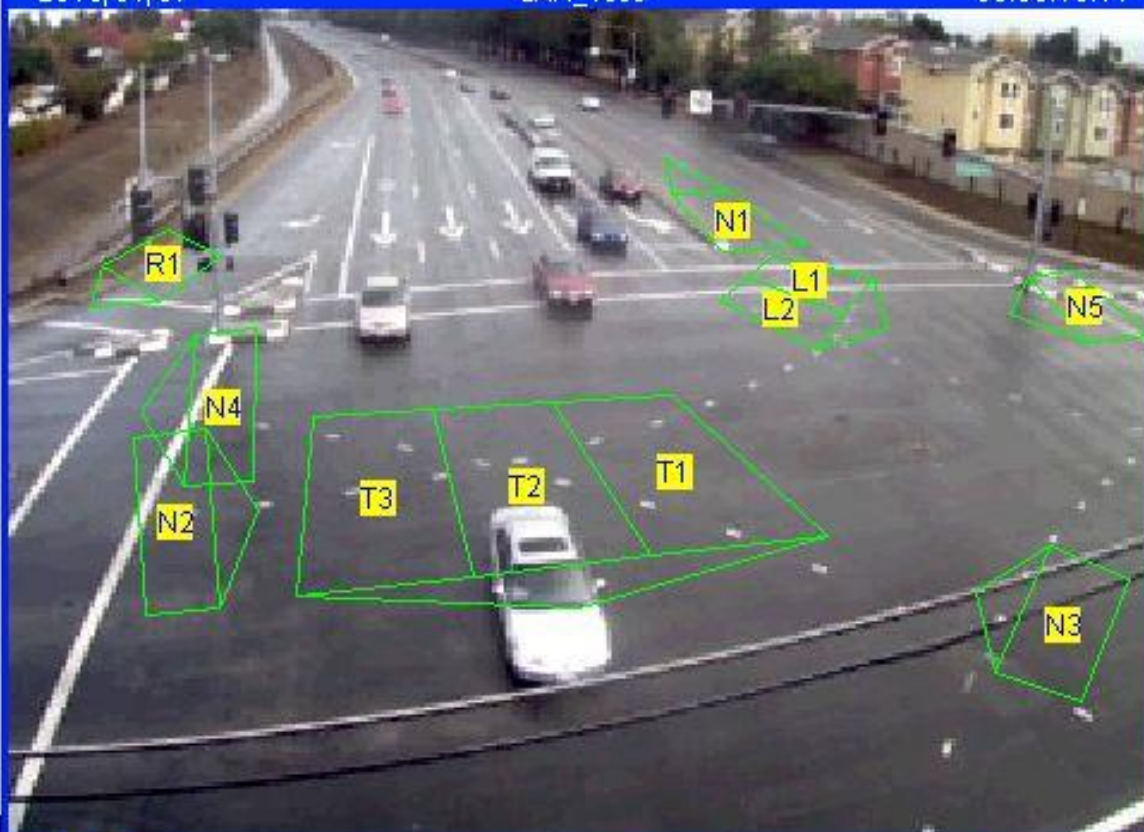
1 CAM\_1608



2013/01/07

CAM\_1608

00:08:13.11



Count - Speed

L2	# 0006	27 MPH
L1	# 0009	30 MPH
T3	# 0035	46 MPH
T2	# 0029	45 MPH
T1	# 0017	39 MPH
R1	# 0017	47 MPH





# Benefits

- Uses Existing Traffic Cameras to collect data
- No additional hardware to install in field
- Off the shelf PC Server to process video images at TOC
- Real-Time 24x7 Traffic Counts from all video feeds
- Rich Traffic data available for planning, operations and maintenance
- Currently 333 cameras counting 24x7; 450 by 2014.
- Low Cost, software licensing per camera feed
- Scalable to add more cameras in the future



Total Number of Cameras 425  
 Number of Cameras: Status = OK 333  
 Number of Cameras: Status = Disabled 0  
 Number of Cameras: Status = Not Connected 77  
 Number of Cameras: Status = Not Streaming 13  
 Number of Cameras: Status = Not Configured 2

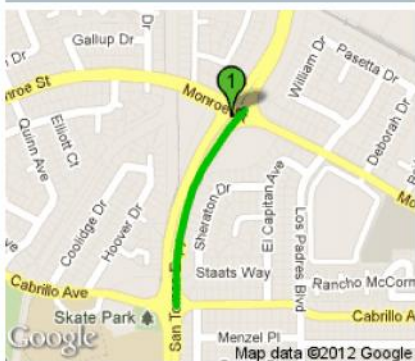
#	PID	ServerID	CamID	URL	RoadID	SegmentID	Dir	Date	Time	fps	bps	Status
1	0	DMZ-09 (247)	CAM_1102	rtsp://10.6.24.112/stream2.m	CT	Mayfield	EB	2013/05/22	21:39:17	0	0	Not Connected
2	1	DMZ-09 (247)	CAM_1103	rtsp://10.6.24.113/stream2.m	CT	Mayfield	SB	2013/05/30	12:15:02	20	48065	Ok
3	2	DMZ-09 (247)	CAM_1106	rtsp://10.6.24.123/stream2.m	CT	Rengstorff	WB	2013/05/30	12:15:17	20	48164	Ok
4	3	DMZ-09 (247)	CAM_1109	rtsp://10.6.24.124/stream2.m	CT	Rengstorff	NB	2013/05/30	12:14:45	20	47096	Ok
5	4	DMZ-09 (247)	CAM_1112	rtsp://10.6.24.127/stream2.m	CT	Farley	EB	2013/05/30	12:15:04	20	46673	Ok
6	5	DMZ-09 (247)	CAM_1113	rtsp://10.6.24.128/stream2.m	CT	Farley	SB	2013/05/30	12:14:46	20	47622	Ok
7	6	DMZ-09 (247)	CAM_1116	rtsp://10.6.24.130/stream2.m	CT	Shoreline West	WB	2013/05/30	12:14:47	20	47296	Ok
8	7	DMZ-09 (247)	CAM_1122	rtsp://10.6.24.135/stream2.m	CT	Shoreline East	EB	2013/05/30	12:14:46	20	47578	Ok
9	8	DMZ-09 (247)	CAM_1123	rtsp://10.6.24.136/stream2.m	CT	Shoreline East	SB	2013/05/30	12:15:16	20	47406	Ok
10	9	DMZ-09 (247)	CAM_1126	rtsp://10.6.24.138/stream2.m	CT	Castro	WB	2013/05/30	12:15:19	20	46825	Ok
11	10	DMZ-09 (247)	CAM_1129	rtsp://10.6.24.141/stream2.m	CT	Castro	NB	2013/05/30	12:15:09	20	47449	Ok
12	11	DMZ-09 (247)	CAM_1132	rtsp://10.6.24.144/stream2.m	CT	Highway 85	EB	2013/05/30	12:14:34	20	47712	Ok
13	12	DMZ-09 (247)	CAM_1133	rtsp://10.6.24.145/stream2.m	CT	Highway 85	SB	2013/05/30	12:15:11	20	47501	Ok
14	13	DMZ-09 (247)	CAM_1136	rtsp://10.6.24.147/stream2.m	CT	Whisman	WB	2013/05/30	12:15:18	20	47243	Ok
15	14	DMZ-09 (247)	CAM_1142	rtsp://10.6.24.152/stream2.m	CT	Ferguson	EB	2013/05/30	12:15:06	20	47401	Ok
16	15	DMZ-09 (247)	CAM_1143	rtsp://10.6.24.153/stream2.m	CT	Ferguson	SB	2013/05/30	12:15:22	20	48007	Ok
17	16	DMZ-09 (247)	CAM_1146	rtsp://10.6.24.155/stream2.m	CT	Bernardo	WB	2013/05/30	12:14:57	20	47971	Ok
18	17	DMZ-09 (247)	CAM_1152	rtsp://10.6.24.160/stream2.m	CT	Mary	EB	2013/05/30	12:14:43	20	47582	Ok
19	18	DMZ-09 (247)	CAM_1153	rtsp://10.6.24.161/stream2.m	CT	Mary	SB	2013/05/30	12:15:28	20	46993	Ok
20	19	DMZ-09 (247)	CAM_1161	rtsp://10.6.24.165/stream2.m	CT	Corvin	WB	2013/05/30	12:14:54	20	47575	Ok
21	20	DMZ-09 (247)	CAM_1164	rtsp://10.6.24.168/stream2.m	CT	Corvin	NB	2013/05/30	12:15:22	20	47925	Ok
22	21	DMZ-09 (247)	CAM_1167	rtsp://10.6.24.171/stream2.m	CT	Bowers	EB	2013/05/30	12:15:08	20	47473	Ok
23	22	DMZ-09 (247)	CAM_1168	rtsp://10.6.24.172/stream2.m	CT	Bowers	SB	2013/05/30	12:15:25	20	47420	Ok
24	23	DMZ-09 (247)	CAM_1172	rtsp://10.6.24.177/stream2.m	CT	Scott	WB	2013/05/30	12:14:47	20	48841	Ok
25	24	DMZ-09 (247)	CAM_1175	rtsp://10.6.24.179/stream2.m	CT	Scott	NB	2013/05/30	12:15:06	20	47318	Ok
26	25	DMZ-09 (247)	CAM_1178	rtsp://10.6.24.182/stream2.m	CT	Fiberglass	EB	2013/05/30	12:15:28	20	47367	Ok
27	26	DMZ-09 (247)	CAM_1182	rtsp://10.6.24.185/stream2.m	CT	Lafayette	WB	2013/05/30	12:14:49	20	47281	Ok
28	27	DMZ-09 (247)	CAM_1184	rtsp://10.6.24.187/stream2.m	CT	Lafayette	SB	2013/05/30	12:14:59	20	47673	Ok
29	28	DMZ-09 (247)	CAM_1187	rtsp://10.6.24.190/stream2.m	CT	De La Cruz	EB	2013/05/22	12:28:30	0	0	Not Connected
30	29	DMZ-09 (247)	CAM_1189	rtsp://10.6.24.192/stream2.m	CT	De La Cruz	NB	2013/05/30	12:14:43	20	48077	Ok
31	30	DMZ-09 (247)	CAM_1202	rtsp://10.6.24.199/stream2.m	LW	Saratoga	SB	2013/05/30	12:14:33	20	47932	Ok
32	31	DMZ-09 (247)	CAM_1206	rtsp://10.6.24.206/stream2.m	LW	Prospect	NB	2013/05/30	12:14:53	20	48710	Ok
33	32	DMZ-09 (247)	CAM_1213	rtsp://10.6.24.213/stream2.m	LW	Doyle	NB	2013/05/23	12:46:55	0	0	Not Connected





## Arterial Station 2721 @ 1627 ft on San Tomas Expy NB

### Current Location



Maps: [Real-Time](#) | [Performance](#) | [Inventory](#)

### District 4, Santa Clara County

#### Arterial Station Details

Controller	<a href="#">85414</a>
Link Length	1735 ft
Downstream	1627 ft
Number of Lanes	5
Speed Limit	31 mph
Midblock Sources	No
Midblock Sinks	No
Pedestrian Crossing	No
Left Turn	No
Parking	Unknown

#### Lane Information

Link	<a href="#">San Tomas Expy</a>
Map Label	1
Feed	Naztec ATMS

#### Lane Flow Occ Speed Fraction Leakage

1	✓	✓	1	0
1	✓	✓	1	0
2	✓	✓	1	0
3	✓	✓	1	0
4	✓	✓	1	0

#### Quick Links

[View another arterial station](#)

Go

Performance ▾ Data Quality ▾

### Performance > Aggregates > Time Series ▾

From: May 3 2012 0 To: May 3 2012 23 Time of Day: ☒ All ☐ 00:00 to 00:59

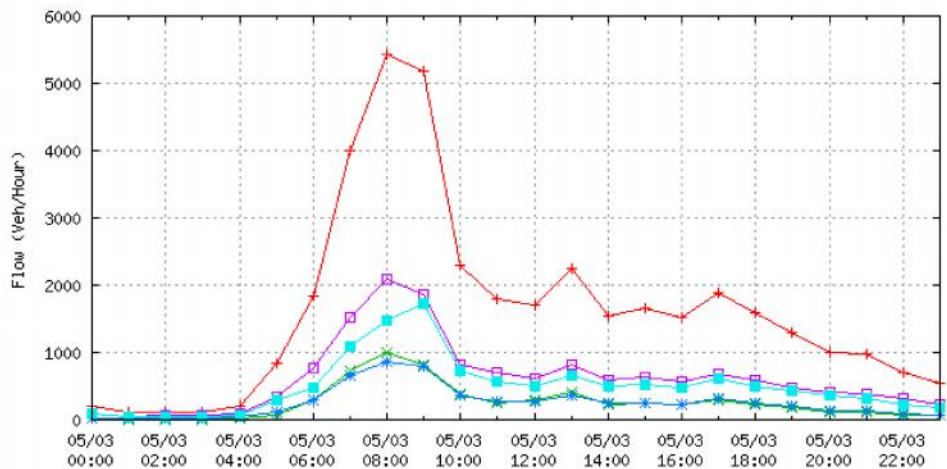
Include Days: ☐ Su ☒ Mo ☒ Tu ☒ We ☒ Th ☒ Fr ☐ Sa ☐ Holidays

Left: ☐ Total ☐ 1 Thru: ☒ Total ☒ 1 ☒ 2 ☒ 3 ☒ 4 Right: Not Available

Quantity: Flow (Veh/Hour) Second Quantity: -- None -- Granularity: Hour

[DRAW PLOT](#) [VIEW TABLE](#) [EXPORT TEXT](#) [EXPORT to XLS](#)

Flow (Veh/Hour) 1,440 Lane Points (97% Observed)  
Segment Type: Arterial Station, Located On: San Tomas Expy  
Thu 05/03/2012 00:00:00 to Thu 05/03/2012 23:59:59 (Days=Mo,Tu,We,Th,Fr)



Thru Total Flow (Veh/Hour) Thru 1 Flow (Veh/Hour) Thru 2 Flow (Veh/Hour) Thru 4 Flow (Veh/Hour)

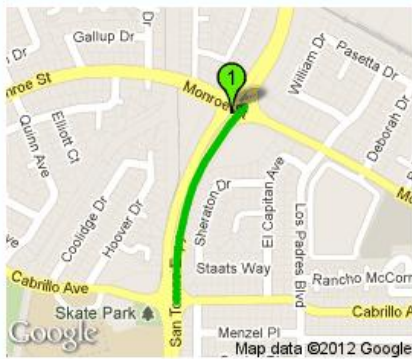
Y-Scale: ☒ Auto ☐ Min ☐ Max

☒ Lines ☒ Points ☒ Grid

Related Aggregates Reports: [Time Series](#) • [Time of Day](#) • [Day of Week](#) • [Quantity Relationships](#)

Arterial Station 2721 @ 1627 ft on San Tomas Expy NB

Current Location



Maps: [Real-Time](#) | [Performance](#) | [Inventory](#)

District 4, Santa Clara County

Arterial Station Details

Controller	<a href="#">85414</a>
Link Length	1735 ft
Downstream	1627 ft
Number of Lanes	5
Speed Limit	31 mph
Midblock Sources	No
Midblock Sinks	No
Pedestrian Crossing	No
Left Turn	No
Parking	Unknown

Lane Information

Link	<a href="#">San Tomas Expy</a>
Map Label	1
Feed	Naztec ATMS

Lane Flow Occ Speed Fraction Leakage

1	✓	✓	1	0
1	✓	✓	1	0
2	✓	✓	1	0
3	✓	✓	1	0
4	✓	✓	1	0

Quick Links

[View another arterial station](#)

Go

Performance ▾ Data Quality ▾

Data Quality > Data Fidelity Timeseries

From May 1 2012 0 To May 2 2012 23

Quantity  
Flow (Veh/5-Min)

Lane  
☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5

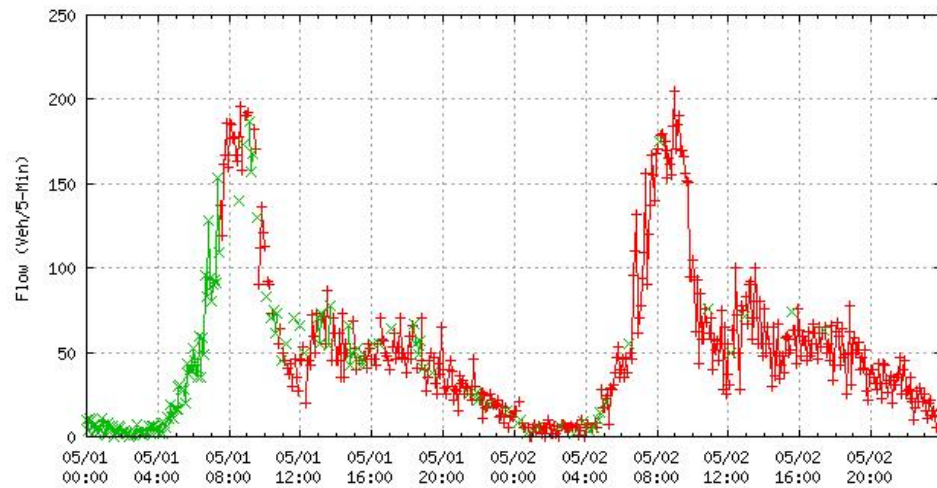
[DRAW PLOT](#)

[VIEW TABLE](#)

[EXPORT TEXT](#)

[EXPORT to XLS](#)

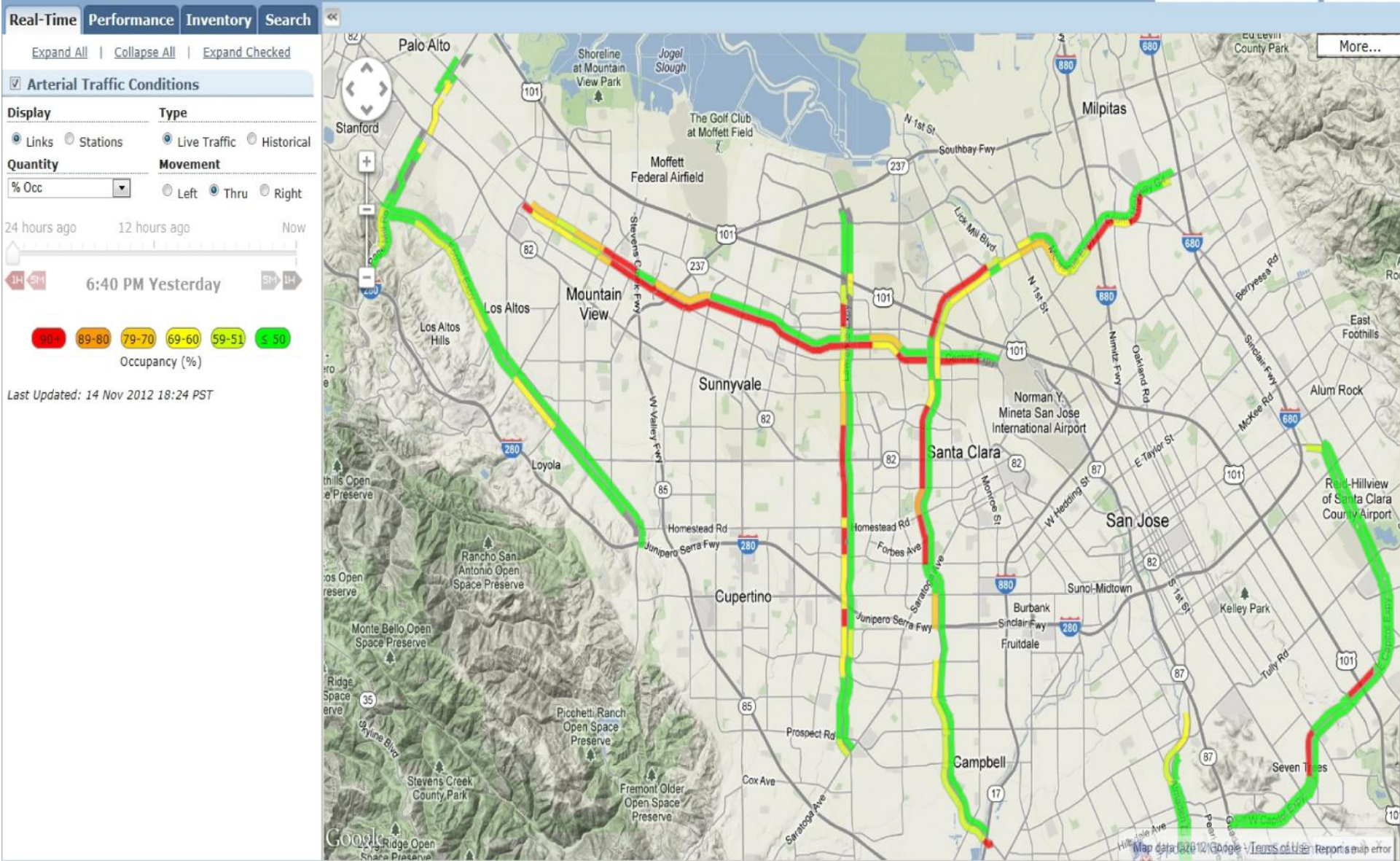
Value Used Flow (Veh/5-Min) - Lane 4  
Arterial Station 2721 @ 1627 ft on San Tomas Expy NB  
Tue 05/01/2012 00:00:00 to Wed 05/02/2012 23:59:59



Y-Scale: ☒ Auto ☐ Min ☐ Max ☐ Lines ☒ Points ☒ Grid

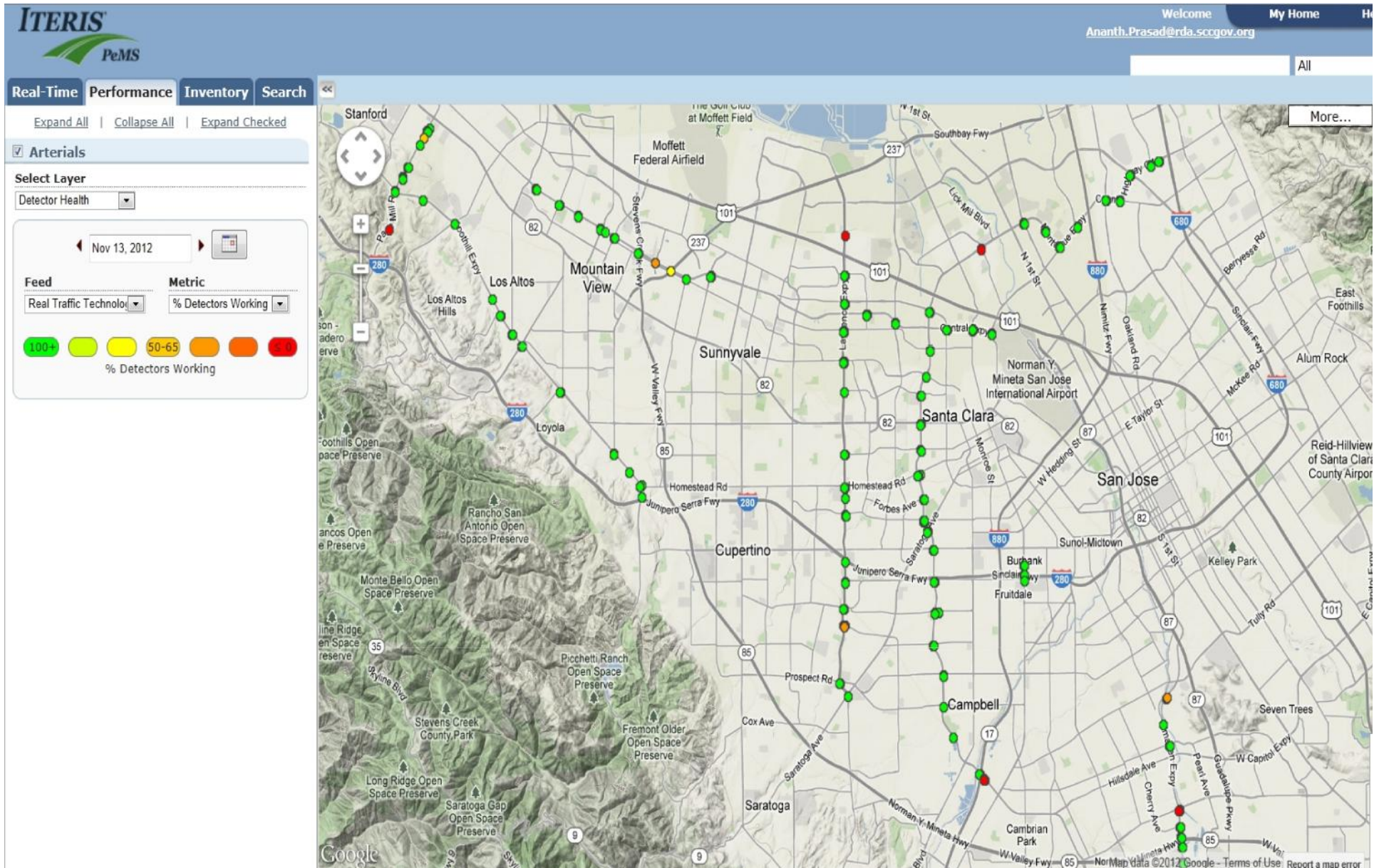


## Real-Time Traffic Congestion Map



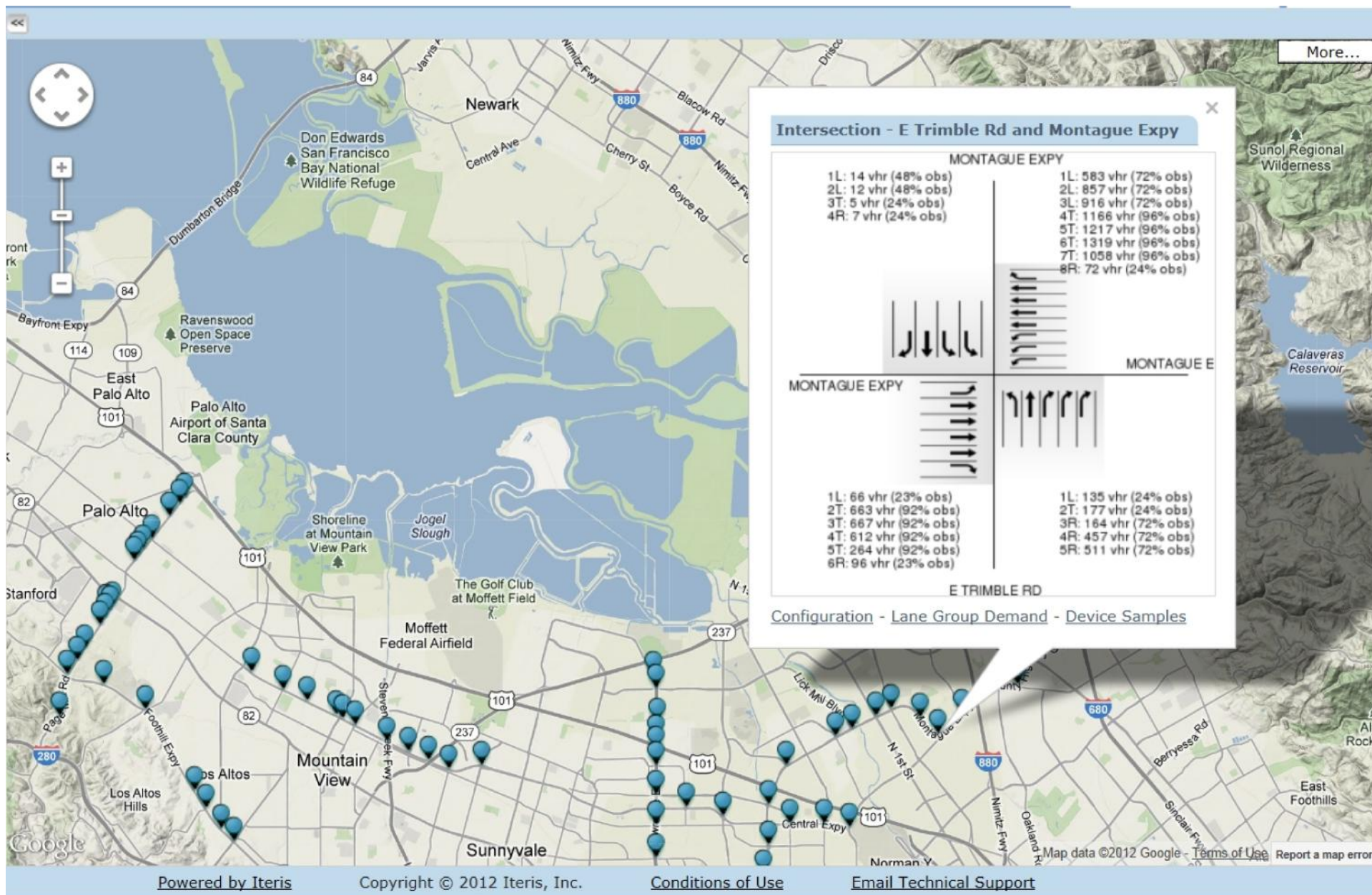


# Detector Health – Intersection Level





# Traffic Counts - Turning Movement



## Current Location



Maps: [Real-Time](#) | [Performance](#) | [Inventory](#)

## District 4, Santa Clara County

### Arterial Station Details

Controller	<a href="#">85414</a>
Link Length	1735 ft
Downstream	1627 ft
Number of Lanes	5
Speed Limit	31 mph
Midblock Sources	No
Midblock Sinks	No
Pedestrian Crossing	No
Left Turn	No
Parking	Unknown

### Lane Information

Link	<a href="#">San Tomas Expy</a>
Map Label	1
Feed	Naztec ATMS

### Lane Flow Occ Speed Fraction Leakage

↖ 1	✓	✓	1	0
↑ 1	✓	✓	1	0
↑ 2	✓	✓	1	0

Performance ▾ Data Quality ▾

Performance > Aggregates >

# Traffic Flow – Week View

From: Nov 7 2012 7 To: Nov 14 2012 18

Time of Day: ☒ All ☐ 00:00 to 00:59

Include Days: ☒ Su ☒ Mo ☒ Tu ☒ We ☒ Th ☒ Fr ☒ Sa ☒ Holidays

Left: ☒ Total ☒ 1

Thru: ☒ Total ☒ 1 ☒ 2 ☒ 3 ☒ 4

Right: Not Available

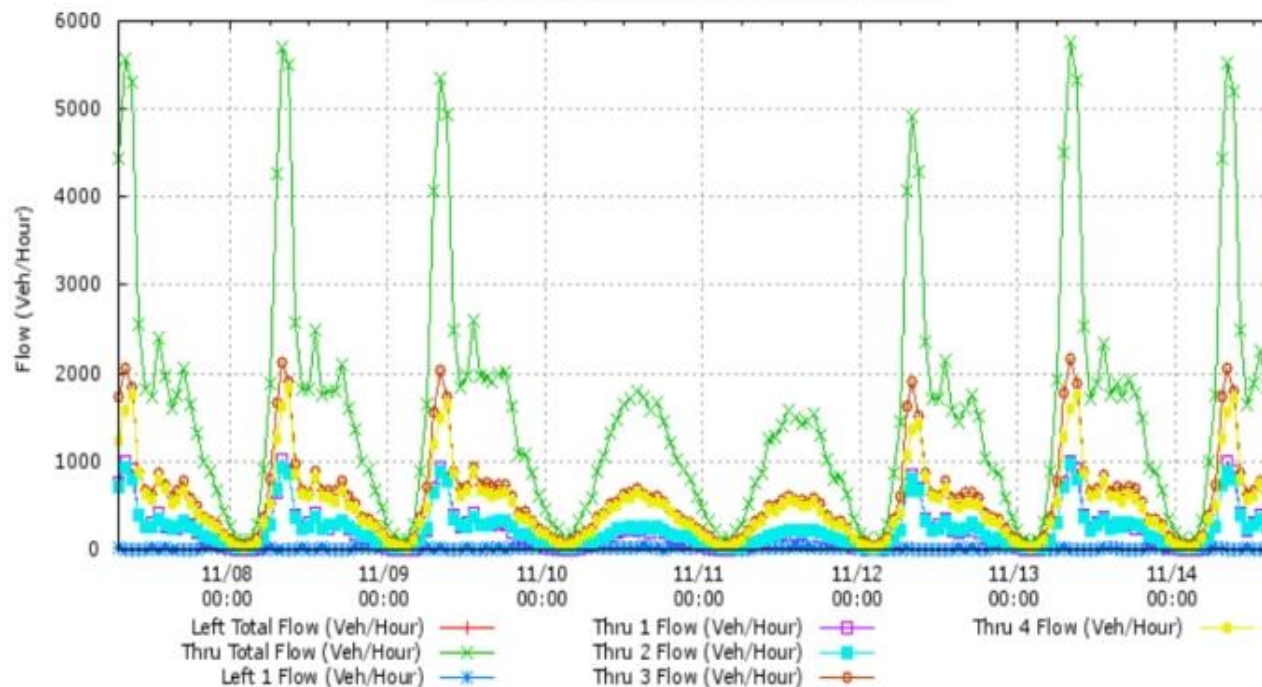
Quantity: Flow (Veh/Hour)

Second Quantity: -- None --

Granularity: Hour

[DRAW PLOT](#) [VIEW TABLE](#) [EXPORT TEXT](#) [EXPORT to XLS](#)

Flow (Veh/Hour) 10,620 Lane Points (100% Observed)  
Segment Type: Arterial Station, Located On: San Tomas Expy  
Wed 11/07/2012 07:00:00 to Wed 11/14/2012 18:59:59





# Data Samples over Long Periods

## System Administration

### Status

[Dashboard](#)
[Troubleshooting](#)

### Data Collection & Processing

[Real-Time Feeds](#)
[Equipment Sets](#)
[Parameter Sets](#)

### User Content

[Routes](#)
[Notifications](#)

### Access Control

[Users](#)
[Groups](#)

### Reports

[Usage Statistics](#)
[Automated Bot Detection](#)

### System Information

[Command Reference](#)
[About PeMS](#)

## Data Collection > Time Series ▾

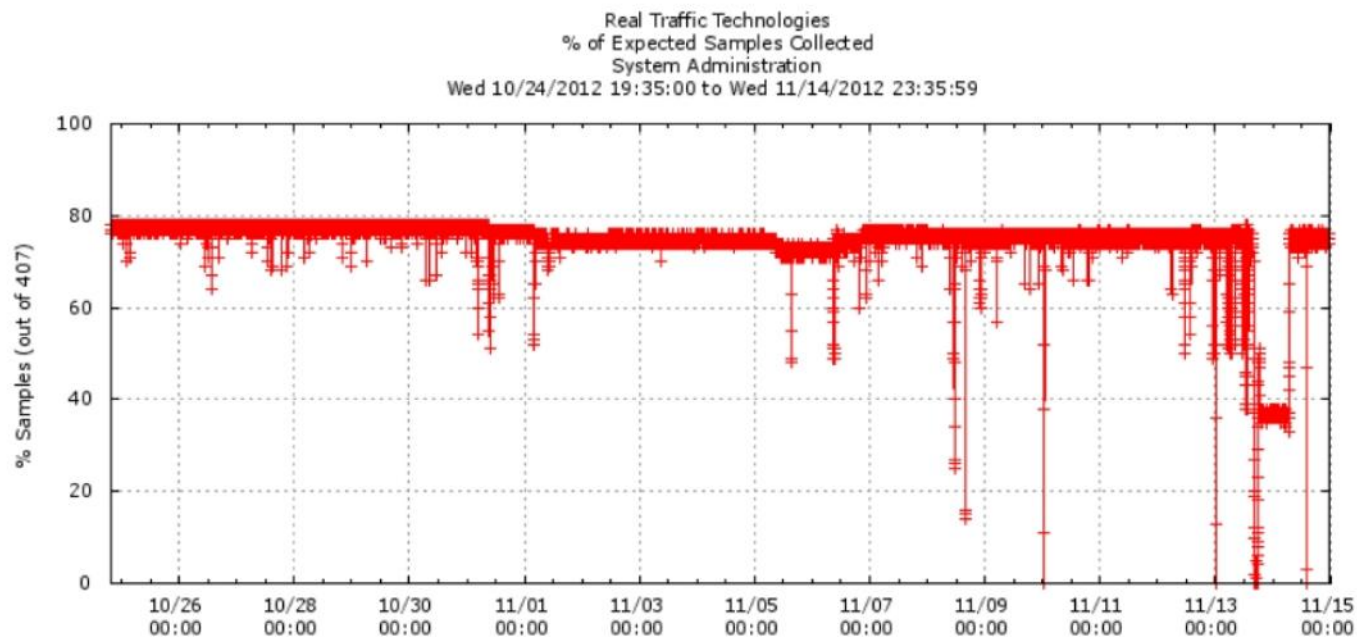
**From**  
 Oct ▾ 24 ▾ 2012 ▾ 19 ▾ 35 ▾

**To**  
 Nov ▾ 14 ▾ 2012 ▾ 23 ▾ 35 ▾

**Feed**  
 Real Traffic Technologies ▾

**Quantity**  
 % of Expected Samples Collected ▾

[DRAW PLOT](#)
[VIEW TABLE](#)
[EXPORT TEXT](#)
[EXPORT to XLS](#)



Y-Scale: ☒ Auto ☐ Min  Max

☒ Lines ☒ Points ☒ Grid

Related Data Collection Reports: [Data Feeds](#) • Time Series

# Data Samples – Hourly

## System Administration

### Status

[Dashboard](#)
[Troubleshooting](#)

### Data Collection & Processing

[Real-Time Feeds](#)
[Equipment Sets](#)
[Parameter Sets](#)

### User Content

[Routes](#)
[Notifications](#)

### Access Control

[Users](#)
[Groups](#)

### Reports

[Usage Statistics](#)
[Automated Bot Detection](#)

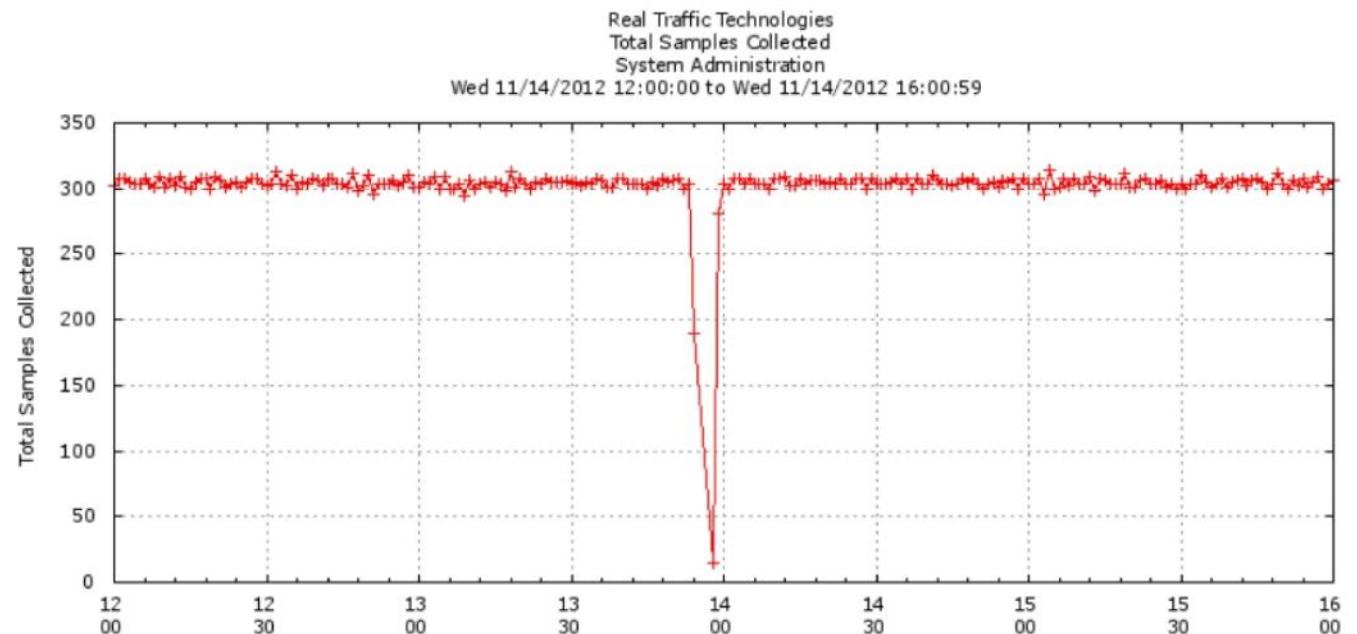
### System Information

[Command Reference](#)
[About PeMS](#)

## Data Collection > Time Series ▾

From	Nov ▾ 14 ▾ 2012 ▾ 12 ▾ 0 ▾	To	Nov ▾ 14 ▾ 2012 ▾ 16 ▾ 0 ▾
Feed	Real Traffic Technologies ▾		
Quantity	Total Samples Collected ▾		

[DRAW PLOT](#)
[VIEW TABLE](#)
[EXPORT TEXT](#)
[EXPORT to .XLS](#)



Y-Scale: ☒ Auto ☐ Min  Max

☒ Lines ☒ Points ☒ Grid

Related Data Collection Reports: [Data Feeds](#) • Time Series



# Looking Ahead

- Finish validating data and collect data archive for full year
- Get Ped & Bike Counts from camera feeds
- Get Vehicle Classification from camera feeds
- Install Bluetooth Scanners at select locations
- Use this data in planning, operation and maintenance
- Develop performance measures, reports, events and alarms
- Share data with public via public and private partnerships
- Leverage on Technology to reduce Congestion

# Questions?

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